

IN Japan the custom prevails of burning down yearly, tri-yearly, or at longer intervals the tracts of ground known as "hara," this name being applied to the bare hillsides which have been denuded of trees. One of the first products on these lands is a grass known as "kaya," *Miscanthus sinensis*, and it is with the idea of increasing this crop that the lands are burnt. This fallacy is combated by Mr. O. Shishido in the *Bulletin* of the College of Agriculture, Tokio, where he points out that the *hara*, although favourably situated, are now practically unproductive areas. In the same journal Mr. H. Shirawasa indicates the development of the oil in the camphor-tree which crystallises out into camphor.

A USEFUL little book has been published by the Royal Geographical Society entitled "Hints on Outfit for Travellers in Tropical Countries," by Dr. Charles F. Harford. The hints are of just the practical kind that intending travellers will find serviceable.

A SIXTH edition of Prof. W. H. Burr's "The Elasticity and Resistance of the Materials of Engineering" has been published by Messrs. John Wiley and Sons, of New York, and Messrs. Chapman and Hall, of London. More than half the book is new, and the advanced matter relating to the general theory of elasticity in amorphous solid bodies, and the theories of torsion and flexure, have been placed at the end of the book as an appendix.

THE Bureau of American Ethnology has published a Natick dictionary compiled by the late Dr. James H. Trumbull. In an introduction Dr. Edward E. Hale explains that the dictionary is published as it was left by Dr. Trumbull, whose widow presented the MS. to the American Antiquarian Society. The manuscript was passed to the late Major Powell, who placed it in the hands of Dr. Gatschet, of the ethnologic staff of the Bureau, who has superintended its publication. It is hoped that the book will form the first volume in a series of vocabularies of the native languages.

It has been shown recently that the composition of the surface layers of a solution differs to a slight extent from the composition of the solution as a whole. Experiments made by Miss C. C. Benson with very dilute amyl alcohol, which readily gives rise to a durable foam on shaking, show that this foam is also different in composition from the main solution, the proportion of alcohol being slightly greater in the foam than in the rest of the liquid. The composition of the solutions was determined by surface tension measurements by the drop method.

THE problem of turning to practical use the free nitrogen of the atmosphere for the purposes of agriculture and industry is one which has excited attention for many years past. According to a recent communication of Dr. Frank, of Charlottenburg, the fixation of atmospheric nitrogen on a technical scale can be effected through the agency of the carbides of the alkaline earth metals. Barium carbide is especially suitable for the purpose, and by the absorption of atmospheric nitrogen is converted directly into barium cyanide. The reaction with calcium carbide proceeds differently, the product obtained being calcium cyanamide, which, however, by heating with water under high pressure is easily converted into calcium carbonate and ammonia. Experiments have, moreover, shown that the calcium cyanamide can be used directly as a means of supplying nitrogen to the soil.

ALTHOUGH the analogy between asymmetric carbon and nitrogen in regard to optical rotation is assured by the fact that the activity of the nitrogen compounds can be explained by a simple extension of the theory of van 't Hoff and

Le Bel, yet previous experiences seem to point to the analogy being very incomplete. The instability and the tendency of the active forms to undergo spontaneous racemisation are conspicuously characteristic of the nitrogen compounds. These properties no doubt depend upon the readiness with which nitrogen passes from the pentavalent into the trivalent form, a transformation which at once destroys the spacial asymmetry. An interesting paper dealing with the subject is published by Dr. Wedekind in the current number of the *Zeitschrift für physikalische Chemie*.

An investigation of the best conditions for the electrolytic refining of copper has recently been carried out by Messrs. F. J. Schwab and I. Baum, an account of which is given in the October number of the *Journal of Physical Chemistry*. The factors which have been taken into consideration are the cost of the power necessary to precipitate a tank of copper with different current densities and at different temperatures, the cost of heating the tank, the deterioration of the electrolyte, the interest charge on the copper in the tank, and the quality of the copper deposited. As the result of a large number of series of experiments, in which the influence of these factors and their correlation were examined, the authors come to the conclusion that in order to operate a plant most economically and to secure the best financial returns, copper should be refined in covered tanks at a temperature of 70° C., with a current density of  $3\frac{1}{2}$ – $3\frac{3}{4}$  amperes per square decimetre.

THE additions to the Zoological Society's Gardens during the past week include two Chestnut-breasted Finches (*Donacola castaneothorax*), a Bicheno's Finch (*Estrela bichenovii*), fourteen Banded Grass Finches (*Poephila cincta*), eight Gouldian Finches (*Poephila gouldiae*) from Queensland, two Modest Grass Finches (*Amadina modesta*), fourteen Chestnut-eared Finches (*Amadina castanotis*), two Undulated Grass Parrakeets (*Melopsittacus undulatus*), a Peaceful Dove (*Geopelia tranquilla*), a Graceful Ground Dove (*Geopelia cuneata*) from Australia, presented by Mrs. Alfred H. Houlder; an American Bittern (*Botaurus lentiginosus*), captured at sea, presented by Mr. Yeo; two Chameleons (*Chamaeleon vulgaris*) from North Africa, presented by Mr. G. T. Coleman; a Hocheur Monkey (*Cercopithecus nictitans*) from West Africa, a Grey Seal (*Halichoerus grypus*) from the West Coast of Ireland, a Red-fronted Lemur (*Lemur rufifrons*) from Madagascar, an Adelaide Parrakeet (*Platycercus adelaidae*) from Australia, deposited; two Great Kangaroos (*Macropus giganteus*) from Australia, a Banded Cotinga (*Cotinga cincta*) from Brazil, purchased; a Hybrid Waterbuck, between (*Cobus unctuosus* ♂ and *Cobus ellipsiprymnus* ♀), born in the Gardens.

#### OUR ASTRONOMICAL COLUMN.

##### ASTRONOMICAL OCCURRENCES IN NOVEMBER:—

- Nov. 3. 3h. 45m. to 7h. 2m. Transit of Jupiter's Sat. III. (Ganymede).  
 7. 11h. 23m. Minimum of Algol (β Persei).  
 9. 8h. 43m. to 9h. 28m. Moon occults λ Geminorum (Mag. 3.6).  
 10. 7h. 26m. to 10h. 44m. Transit of Jupiter's Sat. III. (Ganymede).  
 „ 8h. 12m. Minimum of Algol (β Persei).  
 14–16. Epoch of Leonid Meteors (Radiant 150° + 22°).  
 15. 1h. Venus in conjunction with the Moon. Venus 0° 55' N.  
 „ Venus. Illuminated portion of disc = 0.429.  
 16. 6h. 11m. to 9h. 53m. Transit of Jupiter's Sat. IV. (Callisto).  
 17. 11h. 12m. Transit (ingress) of Jupiter's Sat. III. (Ganymede).  
 27. 23h. Venus at greatest elongation (46° 44' W.).  
 30. 9h. 55m. Minimum of Algol (β Persei).

RECENT SPECTROGRAPHIC OBSERVATIONS OF NOVÆ.—Using the slitless spectrograph recently attached to the Crossley reflector, Prof. Perrine has obtained photographs of the recent spectra of various novæ.

A spectrogram of Nova Aurigæ, taken with a total exposure of 5 hours on August 29 and 30, shows that important changes have taken place in the spectrum of this star since 1901, when the spectrum was photographed by Mr. Stebbins. At that time the chief nebular line at  $\lambda$  501 was equal in intensity to the lines at  $\lambda$  462,  $\lambda$  434, and H $\delta$ , but in the recent photographs it is entirely absent; the other lines are relatively the same, but all appear to have decreased in intensity with regard to the continuous spectrum. This Nova is now of the fourteenth magnitude.

In the case of Nova Persei, a spectrum obtained on July 30, with an exposure of 2 hours 3 minutes, shows that striking changes have taken place since March, 1902. H $\beta$  has decreased greatly in brightness during the interval, and the condensation at  $\lambda$  434 has also become less marked, whilst H $\delta$  has only suffered the normal diminution in brightness. The lines at  $\lambda$  339 and  $\lambda$  346 show the greatest changes, the former having entirely disappeared, whilst the latter is barely distinguishable on the latest spectrogram; the chief nebular line does not appear to have changed relatively to the general spectrum. On July 30 the magnitude of Nova Persei was about 11.5 or 12.

Even in the more recent Nova Geminorum important changes are already noticeable; photographs were secured on August 28, 31, and September 2, and when compared with the observations of May 11 it was seen that during the interval of 3½ months the whole spectrum had become much weaker; the chief nebular line had become much stronger, whilst H $\beta$  had greatly decreased in relative intensity. The line at  $\lambda$  434 is by far the strongest in the whole spectrum, and that at  $\lambda$  463 is much broadened and probably composite; there are also indications of the higher hydrogen lines on the background of continuous spectrum. On a number of spectrograms obtained between April 2 and 8 a condensation at  $\lambda$  350 was a remarkable feature, on April 18 no indications of this condensation were present, whilst on April 26 there was a strong condensation at  $\lambda$  346, but nothing at all at  $\lambda$  350; later observations confirm this interesting phenomenon.

Visual observations of the spectrum of Nova Geminorum, made by Mr. H. D. Curtis on August 17 and 18 with spectrograph No. 1 attached to the 36-inch refractor, showed the three chief nebular lines well developed, H $\beta$  faint, the line at  $\lambda$  4959 rather stronger, and the line at  $\lambda$  5007, into which the greater part of the Nova's light seemed to be concentrated, very much more intense, whilst D and H $\alpha$  were not visible. The change of this star into one of the nebular type is apparently now complete (Lick Observatory Bulletin, No. 48).

OCCULTATION OF A STAR BY JUPITER.—A communication to the Kiel Centralstelle, published in No. 3903 of the *Astronomische Nachrichten*, announced that Mr. T. Banachiewicz, of the Warsaw University, had observed an occultation of the star B.D.—6°.6191 (mag.=6.5) by Jupiter at about 7h. 10m. (Berlin M.T.) on September 19.

Several observers recorded their observations of this phenomenon in No. 3906 of the *Nachrichten*, amongst others Herr Kostinsky, of the Pulkowa Observatory, who gave the times of immersion and emergence as 20h. 10m. 21s.  $\pm$  1s. and 21h. 52m. 4s.  $\pm$  1s. (Pulkowa S.T.) respectively.

In a letter to the October number of the *Observatory*, Mr. Denning gives the details of his observations of the phenomenon about half an hour after the probable reappearance of the star, when it was situated at about 10" from the S.S.E. limb of the planet. He states that the same star will be about 20' south of Jupiter on December 29 at approximately 10h. G.M.T.

ROTATIONAL VELOCITY OF VENUS.—*Bulletin* No. 3 of the Lowell Observatory contains a description, by Mr. V. M. Slipher, of some experiments made at that observatory in order to determine, by the Deslandres spectrographic method, whether Venus has a short rotational period or not.

The instrument used was the new Lowell spectrograph, made by Brashear, which gives an angular dispersion of 46".5 for one tenth-metre when set for the minimum devi-

ation of  $\lambda$  4270. The spectrograph is so attached to the adapter that it may be rotated about the optical axis in order to obtain spectrograms with the slit in various relative positions; the plates used were fine-grain Seed's "23" brand, and were exposed for about 8 minutes during the hour immediately succeeding sunset, whilst the air currents were most quiescent. For purposes of measurement an iron spectrum was photographed on the same plate, and twelve of the finest iron lines were used as fiducial lines. The results obtained show very small probable errors, and indicate that Venus does not possess a short period of rotation. A period of twenty-four hours would cause an inclination of the lines amounting to one-third of a degree, and similar experiments performed on the planet Mars, and published in *Bulletin* No. 4, show that a longer period than this would be clearly indicated by the apparatus and method used.

### THE STANDARDISATION OF ELECTRICAL PRESSURES AND FREQUENCIES.

WE have received a copy of the resolutions of the Engineering Standards Committee with reference to standard pressures for direct current and standard frequencies. In view of the importance of the subject to the electrical industry at large, the document is reprinted below in full.

#### Standard Direct Current Pressures and Standard Frequencies.

The standardisation of electrical pressures and frequencies was the first portion of the important work entrusted to the subcommittee on generators, motors and transformers by the electrical plant committee. The subcommittee consists of the following gentlemen:—

Colonel R. E. Crompton, C.B., chairman.

Colonel H. C. Holden, R.A., Captain A. H. Dumaesq, R.E., representing the War Office.

Commander G. L. Sclater, R.N., Mr. L. J. Steele, representing the Admiralty.

Mr. Llewellyn Preece, representing the Crown Agents for the Colonies.

Dr. R. T. Glazebrook, representing the National Physical Laboratory.

Mr. B. H. Antill, Mr. W. B. Esson, nominated by the Electrical Engineers' Plant Manufacturers' Association.

Mr. A. C. Eborall.

Mr. S. Z. de Ferranti.

Mr. Robert Hammond.

Captain H. R. Sankey.

Mr. C. H. Wordingham.

Mr. Leslie S. Robertson, secretary.

Mr. C. le Maistre, electrical assistant secretary.

At an early stage in their deliberations, the subcommittee decided that the most advantageous method of approaching this problem, beset as it is with so many difficulties, would be from the point of view of those most affected, namely the users of lamps and of motors for power purposes. It was therefore agreed that the standard pressures to be suggested should be measured at the consumers' terminals as settled by Act of 1899.

At the present time there exist many different pressures declared by the various lighting and power authorities. In view of the great desirability of obviating this unsatisfactory state of affairs it was deemed advisable to suggest the minimum number of standard pressures which would best meet present commercial requirements and, at the same time, utilise to the fullest extent the consumers' existing appliances.

After careful consideration, it became evident to the subcommittee that the direct current pressures of 110, 220, 440, and 500 volts would best meet the requirements, because carcasses built for these standard pressures could be utilised for pressures 10 per cent. above or below the suggested standards, without any alteration whatever in the castings or mechanical components, by merely altering the windings and excitation.

It is to be hoped that now these direct current pressures have been fixed as standards by the committee, they will in future be universally adopted by the engineers advising